



## Assessing Immunization Rates in an Ambulatory Care Setting

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**ABSTRACT** *Members of the Collaborative Immunization Initiatives determined the immunization coverage rates for two groups of children in our clinic: those 7 to 12 months old and those 18 to 23 months old. The Clinic Assessment Software Application from the Centers for Disease Control and Prevention was used. The immunization rates determined by this method appeared to significantly underestimate the vaccination coverage rates in our clinic. A review of available charts included in the original sample was done excluding patients no longer attending our clinic. We found a higher rate of coverage in the same sample and a low rate of missed opportunities for administering immunizations. The major reason for this discrepancy is overly stringent Clinic Assessment Software Application inclusion criteria. Additional factors include failure to take into account the wide range of acceptable ages for administering immunizations and different dosages for different brands of vaccines. Different methods of calculation may cause as much as a 20% difference in immunization rates for the same or similar population groups. Such large differences may lead to vastly different responses and interventions. We believe that a central registry is the most accurate method of determining immunization rates. Until this is widely available and applied, a more accurate measure of a facility's immunization effectiveness is the number of missed opportunities for administering immunizations.*

**KEYWORDS** *Immunization, Immunization Programs, Immunization Rates, Patient Participation Rates, Registries, Vaccination.*

### INTRODUCTION

Members of the Collaborative Immunization Initiatives reviewed the immunization records of a sample of children enrolled at the Pediatric Ambulatory Clinic at the Wyckoff Heights Medical Center in Brooklyn, New York, to assess the vaccination coverage levels. The members of this team represented the New York City Department of Health, the Centers for Disease Control and Prevention, and the Albert Einstein College of Medicine. All children sampled were either in Medicaid managed-care or Medicaid fee-for-service programs.

Wyckoff Heights Medical Center is located in the Bushwick section of northern Brooklyn. The hospital services a significant number of Medicaid and indigent patients. The communities of Bushwick and its surroundings are underserved, low-income, inner-city areas.

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**TABLE 1. Results for subjects 7–12 months old**

Immunization	Charts reviewed, N	Children whose vaccinations were complete, N	Children whose vaccinations were complete, %
3 DTP	56	22	39.3
2 Polio	56	32	57.1
3 Hib*	56	21	37.5
2 Hib†	56	33	58.9
3 Hep B‡	56	19	33.9
3 DTP, 2 Polio, 3 Hib*	56	21	37.5
3 DTP, 2 Polio, 3 Hib, 3 Hep B*	56	18	32.1

\*These combinations are not applicable to our clinic as we use mainly Pedvax (Merck), which only requires two doses of the primary series.

†This rate was calculated from the original Collaborative Immunization Initiatives sample and included all children.

‡These immunization rates may not represent true missed opportunities as our practice is to give the third Hep B at 9 months of age; therefore, infants evaluated at 7 months will not have received this immunization.

Two age groups were surveyed: 7 to 12 months and 18 to 23 months. Immunization coverage was calculated based on the assumption that children in the group aged 7 to 12 months should have received three diphtheria and tetanus toxoid and pertussis (DTaP), two poliovirus, three *Haemophilus influenza* type b (Hib), and three hepatitis B (Hep B) immunizations, and children in the 18–23-month group should have received four DTaP, three polio, four Hib, three Hep B, and 1 measles-mumps-rubella (MMR) immunizations (G. Fairbrother, Principal Investigator, Collaborative Immunization Initiatives, written communication, 1999). The results of this review are listed in Tables 1 and 2.

These results did not appear to reflect our overall impression of our immunization rates. The rates of completed immunizations in both groups were much lower than we expected. The percentage of children whose vaccinations were complete in our group aged 18–23 months was much lower than the national vaccination coverage levels among children 19–35 months as measured in 1998 by the National

**TABLE 2. Results for subjects 18–23 month olds**

Immunization	Charts reviewed, N	Children whose vaccinations were complete, N	Children whose vaccinations were complete, %
4 DTP	72	6	8.3
3 Polio	72	16	22.2
4 Hib*	72	6	8.3
3 Hep B	72	19	26.4
1 MMR	72	10	13.9
4 DTP, 3 Polio, 4 Hib, 1 MMR*	72	6	8.3
4 DTP, 3 Polio, 4 Hib, 3 Hep B, 1 MMR*	72	6	8.3

\*These combinations are not applicable to our clinic as we use Pedvax (Merck), which only requires two doses of the primary series and one booster dose for a total of three doses, not four.

Immunization Survey.<sup>1</sup> The 1998 survey was based on parental recall combined with data requested from vaccination providers for completeness and verification.<sup>2</sup> In that survey, coverage for each of three polio immunizations, three Hib immunizations, and one dose of measles-containing vaccine was more than 90%. Coverage for three doses of hepatitis B vaccine and four doses of DTaP/DT was 87% and 84%, respectively. The National Immunization Survey for the New York City area in 1997 found similar coverage rates.<sup>2</sup>

We found that the calculation of our clinic's immunization rates did not take into account the wide acceptable age range for certain vaccines as noted in the Recommended Childhood Immunization Schedule approved by the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, and the American Academy of Family Physicians.<sup>3</sup> In accordance with the recommendation of acceptable age ranges for administering the third dose of hepatitis B vaccine (6–18 months), it is the usual practice of this clinic to administer the third hepatitis B vaccine at the 9-month visit. Furthermore, during the period of the survey, our clinic was administering mainly Pedvax Hib vaccine (Merck). This form of Hib vaccine requires only two doses for the primary series.<sup>3</sup> Therefore, all data in Table 1 that assess vaccine coverage rates based on children receiving three doses of hepatitis B vaccine and three doses of Hib vaccine by 12 months of age underestimate the actual immunization coverage rates. Similarly, all data in Table 2 that include four Hib vaccines give rise to the same problem.

To confirm our impressions, we reevaluated those charts of children whose immunization status was assessed by the visiting team as incomplete. A large proportion of those children did not return for follow-up visits and may have gone elsewhere for routine pediatric visits and immunizations. Therefore, calculating true immunization rates for this population group was not possible. We then excluded the charts of children who were no longer followed in our clinic and recalculated the immunization rates of children actively attending our clinic. The charts were also reviewed to establish which children had clinic visits documented in the chart beyond the age at which immunizations were due but were not given. These cases would represent missed opportunities for immunization.

## RESULTS

The results of our chart reevaluation were as follows: In the age group 7–12 months old, 56 charts were reviewed during the initial evaluation, with 38 (67.8%) reported as having incomplete immunizations. Of these 38 charts, 36 were available for reevaluation. In only 2 charts (5.5%) were there missed opportunities for immunizing a child.

In the group aged 18–23 months, 72 charts were randomly selected for the initial evaluation, and 66 (91.7%) were referred for incomplete series. Of these 66 charts, 33 were available for reevaluation. Of these 33 patients, none had missed an opportunity to receive a DTP booster or a third hepatitis B immunization. One child (3%) missed a polio booster, and 1 child (3%) missed the first MMR immunization.

Tables 3 and 4 show the recalculated immunization coverage rates for children in the 7–12-month and 18–23-month groups, respectively, excluding those children no longer followed in our clinic. These coverage rates are similar to the national coverage rates and the rates for New York City.<sup>1,2</sup>

**TABLE 3. Immunization rates of children 7–12 months old excluding children no longer followed at WHMC**

Immunization	Vaccinations complete by CASA criteria, %	Vaccinations complete by new criteria,* %
3 DTP	39.3	91.6
2 Polio	57.1	96.9
2 Hib	58.9	100

\*Excluding those no longer followed at WHMC.

## DISCUSSION

In 1993, the Childhood Immunization Initiative (CII) was started to increase immunization rates during the first 2 years of life to more than 90% by 1996 for universally recommended vaccinations. Strategies to improve immunization coverage are largely based on the perceived immunization coverage rate in the population. Vaccination coverage rates are often used as the primary measure of intervention effectiveness.<sup>4</sup> Methods to assess immunization coverage rates include parental recall, immunization cards, and audit of provider records.

The different methods of evaluation may result in as much as a 20% difference in immunization rates for the same or similar population groups.<sup>5–7</sup> Such large differences may lead to vastly different responses and interventions.

The Clinic Assessment Software Application (CASA) was developed by the Centers for Disease Control and Prevention (CDC) to assess coverage rates at provider sites. As this method is provider based and not based on a geographic area, criteria had to be established to determine as to which children the provider is to be accountable. CASA requires absolute confirmation that the child has moved or gone elsewhere.<sup>8</sup> At least one of the following forms of documentation in the medical record is required:

1. The child's records were transferred to a new practice.
2. A letter from another provider that the patient is in a new practice.
3. A mailed reminder card/letter returned by the post office without a local forwarding address.

**TABLE 4. Immunization rates of children 18–23 months old excluding children no longer followed at WHMC**

Immunization	Vaccinations complete by CASA criteria, %	Vaccinations complete by new criteria,* %
4 DTP	8.3	100
3 Polio	22.2	94.7
3 Hep B	26.4	100
1 MMR	13.9	91.6
4 DTP, 3 Polio, 3 Hib, 1 MMR	N/A†	87.5

\*Excluding those no longer followed at WHMC.

†This figure was not calculated in the original survey.

4. The parent or guardian stated that the child was seeing another provider for their medical care.
5. A home visit or telephone contact indicated that the child or family no longer resided at the address.

CASA includes children with only one visit and only excludes children if they meet the above criteria.

In our clinic, the appointment schedule is reviewed at the end of each day, and all patients who did not keep their scheduled appointments are sent letters with a new appointment. If the parents or guardians do not keep this appointment, a second letter is sent to the parents.

Several reasons may account for the many children who do not return to our clinic. The population served by this hospital has a high rate of unemployment and poverty, and many families are itinerant. Many infants born in the hospital return for the first or second postnatal visit and then switch to a neighborhood provider. Changing from Medicaid to a Medicaid health maintenance organization also appears to contribute to the changing of health care providers, as does losing private insurance.

We believe that the immunization rates determined by the chart review done by the Collaborative Immunization Initiatives were not an accurate reflection of our clinic's immunization coverage (G. Fairbrother, Principal Investigator, Collaborative Immunization Initiatives, written communication, 1999). By applying the unreasonably restrictive CASA criteria for determining which children may be excluded from the audit, there was an underestimation of the true rates of immunization of children who had changed providers (G. Fairbrother, Principal Investigator, Collaborative Immunization Initiatives, written communication, 1999).<sup>7</sup> The large increase in immunization rates we found after excluding children no longer followed in our clinic would suggest that overinclusion of children due to the CASA criteria is the major reason for the low coverage rates found by the Collaborative Immunization Initiatives evaluation. The wide acceptable age range for administering certain vaccines was not taken into account nor was the brand of Hib vaccine used. Recalculating the immunization rate for Hib in the original sample using two doses of Pedvax Hib led to an increase of over 20% in the coverage rate (Table 3). A further 41.1% increase was noted by excluding children no longer attending our clinic.

In our opinion, until we have a complete central registry, it is very difficult to determine the true immunization rates in a hospital clinic. Chart review alone with CASA criteria appears to cause an underestimation of immunization rates. The effect of this is that immunization rates of the clinic population may not reflect the immunization rates of the population the clinic serves. Therefore, we believe that a more accurate and specific measure of a facility's immunization effectiveness is made by calculating missed opportunities among children actively enrolled in that facility.

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